

Halal Assessment Model Design in Bakery Industry

Alyani Rahma Putri^{1*}, Nilda Tri Putri², Alizar Hasan³, Ikhwan Arief⁴, Hayati Habibah Abdul Talib⁵

^{1,2,3,4}Departement of Industrial Engineering, Faculty of Engineering, Universitas Andalas, Padang, Indonesia

⁵Faculty of Technology and Informatics Razak, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

e-mail: alyani.rahma96@gmail.com^{*1}, nildatp@eng.unand.ac.id², alizar_hasan@eng.unand.ac.id³,
ikhwan@eng.unand.ac.id⁴, hayati@utm.my⁵

*Corresponding Author

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Abstract: Bakery product is a product with huge business opportunities in the domestic and international halal food market. Bakery companies are demanded to keep the trust of the consumers to the bakery product. The design of the halal assessment model is required to determine the critical point in the bakery-making business process. This assessment tool is intended to understand, know, and determine the critical point of the bakery production process from the halalness degree and is reviewed from all aspects such as the materials' content, as well as the material acquisition and processing method based on 18 criteria of GMP principles (Good Manufacturing Practices). The halal assessment model designed in this research used QFD (Quality Function Deployment) approach which was integrated into the company's business process and the halal critical bakery was grouped based on SCOR (Supply Chain Operations Reference) model. Matrix 1 integrated GMP (Good Manufacturing Practices) and business process (BP), matrix 2 integrated GMP (Good Manufacturing Practices), and halal critical bakery (HCB). The results of the design model implementation based on the standards set by the Halal Auditor of LPPOM MUI found that the standard matrix component 1 was met by the company by 47%, while the matrix component 2 was only able to meet the Auditor standards by 34% and the matrix component 3 standards were able to fulfilled by the company by 75%. The fulfillment value of each matrix is influenced by the negative gap that occurs, the negative gap occurs because of the standard criteria in the technical matrix that are not met. The result of this halal assessment model design is expected to help the company in evaluating and controlling critical points found in the business processes.

Keywords: GMP (Good Manufacturing Practices), QFD, SCOR Model.

1. Introduction

One type of food that uses complex food additives is a bakery, bakery has several opportunities for contamination of haram ingredients into their products (Rizka et al., 2018). Ingredients that are considered halal critical in bakery products are wheat flour, rum, developer ingredients, sea urchin brushes, meat & its processed products, ovalets, shortening, margarine, cheese, yeast, creamer, gelatin, chocolate, and emulsifier or better known by the trademark TBM that is useful so that cake dough becomes more fused and stable (LPPOM MUI, 2008). Whatever type of food is once halal (including bakery), if it is mixed with something haram, then the law becomes haram (Qardhawi, 1993). Facts in this field show that halal labels and information on ingredient content in bakery products are important and are urgent attributes for Muslim consumers, this is because some additional ingredients used in the manufacture of bakery products are at a critical point of prohibition and cannot be ignored.

Halal food requirements do not only focus on the ingredients in food, safety, and hygiene aspects are also a part that must be strictly monitored by the company and the government for all stages of the production process, including production, processing, packaging, storage, and transportation. All stages throughout the production process must be ensured to meet all requirements in accordance with halal standards (Prabowo & Rahman, 2016). According to Koeswinarno (2020), the regulation of Halal Product Guarantee (*Jaminan Produk Halal*) in the Law. No. 33 of 2014 is a political power that regulates product halalness. The concept of comprehensive protection for Muslims includes not only religious requirements such as avoiding alcohol and pork but also product safety, health, and hygiene (Koeswinarno, 2020).

The halalness of a product is divided into 5 criteria: the first criterion, the product has been declared halal according to the law. No. 33 of 2014; second, the materials does not come from forbidden material or its derivatives; third, No khamr or contains intoxicating elements; fourth, does not contain parts of the human body or its derivatives; and the fifth criterion is No mixed or contaminated of halal products with unclean goods during production, storage, transportation, distribution, and presentation Permana et al. (2019).

Bakery is the object of research examined in this article. According to Arsyian (2019), people who live in big cities prefer bread as a complementary staple food because bread has a higher and complete nutritional content than other complementary staple foods, so it can replace the function of rice as the main source of carbohydrates (Arsyian, 2019), as can also be seen from research results (Figure 1).

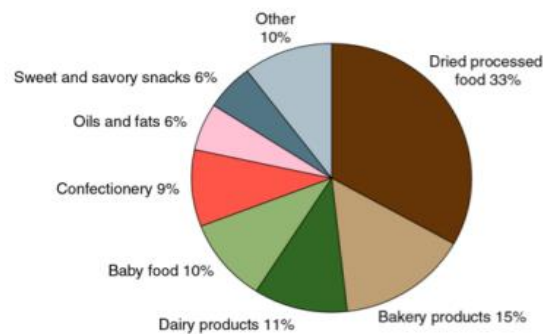


Figure 1. Global Market for Halal Products

The fact that bakery products rank second in the global market for halal products signifies that bakery products are a market with great opportunities in the halal food business at home and abroad Dyck et al. (2012).

GMP (Good Manufacturing Practices) in the food industry is used as a halal food reference standard that makes the food industry ready to conduct business processes by sharia or Islamic law. Preparatory work starts from the following aspects: the use and selection of products to be used, the supplier of the product to be used, the production process used, the process of storing unfinished products to the final product, and the way of allocating and the separation process in this process such as how to store and how to transport halal products or food to avoid things that are unclean or forbidden (Maarif, 2016).

Bakery X is a bakery company and is also one of the bread industries in Pekanbaru that has received halal certification from LPPOM MUI. The products studied are buns, as the main products that continue to be produced by companies that use chocolate toppings, meat, and mozzarella cheese imported from abroad, the topping used is one of the ingredients that became a tipping point and prohibition in making bread. According to Astuti et al. (2020), the rampant globalization of the food industry has affected most food and beverages that require traders to buy groceries from abroad to Indonesia Astuti et al. (2020). As long as Bakery X was established, the company has never used halal assessment tools with any method on their company, Bakery X only sees the page side of the halal label. Therefore, it is necessary to design halal assessment tools at Bakery X to see if the ingredients and processes used in producing bakeries already use halal ingredients and safe processes.

Previous research on the design of halal measurement model is in chicken meat processing, in this study using quality function deployment method in PT. X conducted by Maarif (2016) and Helmi (2019) has also discussed the design of the Halal Measurement Model in Household Industry using Quality Function Deployment Method. But there is currently no further research on the application of QFD in the development of halal food in the bakery industry in previous research. This halal assessment design on bakery X used Quality Function Deployment (QFD) method to design the conceptual model. This research aimed to design a conceptual model for critical points in every product-making process. The determination of critical points in the designed assessment model was seen from the halalness degree and was reviewed from every aspect of the material content used in the bun's making process. The material acquisition and processing were based on the 18 principles of Good Manufacturing Practices (GMP). The Quality Function Deployment (QFD) approach, which was integrated on business process and critical bakery, which was categorized using SCOR model became the selected method in this research. The implementation results in Bakery X show that for Matrix 1 integrated GMP (Good Manufacturing Practices) and business processes (BP) filled by Bakery X by 47%, matrix 2 GMP integrated (Good Manufacturing Practices) and halal critical bakery (HCB) filled by Bakery X by 34%, and matrix 3 integrated business process (BP) and halal critical bakery (HCB) filled by Bakery X by 75%, which means there are still gaps to note in the selection and sorting of raw materials, processing of semi-finished materials, and processing of finished materials. In matrices 2 and 3, there is also a gap in the halal critical bakery (HCB) component, namely Actor (employee). Therefore, the design of this

assessment model is expected to help companies in evaluating and controlling the critical points contained in business processes.

2. Materials and Methods

The halal assessment model in this study uses the Quality Function Deployment method. According to Bernal et al. (2009), HOQ or (House of Quality) is a matrix included in the method of implementing the quality function Bernal et al. (2009). HOQ aims to determine the important under points of halalness in the business process of making buns. The initial QFD model in this study was made based on the guidelines for GMP (Good Manufacturing Practices) criteria and the halal critical point in the Bakery according to the MUI. After the initial QFD model was designed, the halal factors were validated by the LPPOM MUI and the company management through interviews and standard weighting (Sutawidjaya & Asmarani, 2018).

The initial QFD model in this study consists of 3 matrices based on the QFD assessment model belonging to the research of Cardoso et al. (2015) which examines the application of the quality function application in the development of organic products to produce an organic food QFD evaluation model. The initial QFD model in this research consists of 3 matrices that was based on the QFD assessment model (Cardoso et al., 2015). These three adopted matrices in this research are QFD halal evaluation referemodells. On the verification stage, there are 3 matrices. Matrix 1 integrated GMP (Good Manufacturing Practices) and business process (BP), matrix 2 integrated GMP (Good Manufacturing Practices) and halal critical bakery (HCB), and matrix 3 integrated business process (BP) and halal critical bakery (HCB).

2.1. Matrix 1 GMP (Good Manufacturing Practices) and Business Process

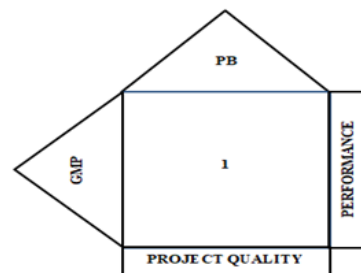


Figure 2. Matrix 1 Conceptual Model

In the halal assessment model using matrix 1 QFD, the GMP was made as an attribute and BP as a technical response (Figure 2). GMP consists of criteria that had been adjusted with the actual condition of the bakery company (Table 1).

Table 1. GMP Criteria

GMP Principal	Terms or Uses
Location	The industrial location is clean, free from garbage, odor, smoke, and dirt.
Building	Easy to clean, easy to sanitize, and easy to maintain.
Sanitation Facilities	Sanitation facilities are made based on plans that meet technical and hygienic plans.
Machinery and Tools	Equipment is placed in the order of the production process.
Material	The raw materials used are not damaged, rotten, and contain hazardous materials.
Process Monitoring	Material control, contamination control, process time, and temperature control.
The Final Product	Final product quality and safety inspection.
Employees	Employees are fit and clean.
Packaging	Goods are stored and handled hygienically.
Labelling	Product name labeling.
Storage of Production Tools and Raw Materials	Proper storage of production equipment, raw materials, and finished products.
Maintenance And Sanitation Program	Cleaning of production equipment and environment.
Transport	Availability of safe and hygienic containers and means of transportation.

GMP Principal	Terms or Uses
Documentation and Recording	Recording of raw materials and final products.
Training	Cleaning, training, and employee health.
Product Withdrawal	Availability of training on basic hygiene, basic principles of cleaning and sanitation, material handling, and cleaning for employees, as well as participating in halal and safe training.
Guideline Implementation	Withdrawal of products suspected of being contaminated with illegal and dangerous substances.

The weighing of the business process's critical rate was also performed to obtain the weighing for each business process. The weighing was done by the HRD Director and QC Department who understand the entire business process and also by Halal Auditor. The bun making process at Bakery X consists of:

- Raw Material Purchasing
- Raw Material Selection and Sorting
- Raw Material Cleaning
- Storage
- Semi-Finished Material Processing
- Semi-Finished Material Delivery to Bakery X Outlets
- Finished Material Processing
- Finishing and Plating*
- Sales

2.2. Matrix 2 GMP (Good Manufacturing Practices) and Halal Critical Bakery

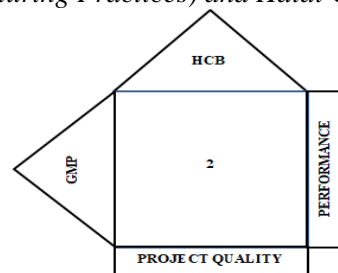


Figure 3. Matrix 2 Conceptual Model

In the halal assessment model using matrix 2 QFD, the GMP was made as an attribute and HCB as a technical response (Figure 3). GMP consists of criteria that had been adjusted with the actual condition of the bakery company. Similar to matrix 1, GMP in matrix 2 is also grouped using SCOR (Supply Chain Operations Reference) model. According to Cardoso et al., (2015) SCOR is a process reference model that incorporates concepts in the reengineering of business processes. This model is arranged divided into five components, namely Plan, Source, Make, Deliver, and Return Cardoso et al., (2015). After that, the HCB component was determined as the technical response. GMP is every aspect in the business process at Bakery X. The determination of halal critical point on bun can be found on Table 2.

Table 2. Halal Critical Point on Bun

Material	Characteristic
Wheat Flour	The wheat flour used does not contain additives, namely L-cysteine which is made from human hair, and various types of gums and gelatin whose halalness are doubted.
Leavening Agent	Not using cream of tartar because it is produced from the wine industry (a type of liquor)
Pig hair brush	Not using brushes that contain the word Bristle.
Meat and its processed products	Not using haram meat or haram processed products (meat, sausage, beef floss) such as: pork, etc
Shortening	Not using white butter made from haram animal's fat
Margarine	The margarine used does not use illegal stabilizers.

Material	Characteristic
Instant baker's yeast	Not using yeast added with emulsifying ingredients from haram ingredients, such as: pork lecithin and anti-clotting compounds. Must be clearly halal
Cheese	Not using enzymes and starters (so that the cheese clumps) which come from the digestive tract of animals that are haram.
Chocolate	Not using an emulsifier derived from animal lecithin which is made enzymatically using the phospholipase A2 enzyme derived from pig pancreas
Tomato or chili sauce	Not using textile dyes due to the presence of heavy metal residues that are harmful to health, as well as using specified stabilizers.
Mayonnaise	Paying attention to the halal status of additional ingredients such as oil and vinegar.

Halal critical bakery (HCB) grouping which includes all aspects related to business processes at Bakery X:

a. Raw Materials

Cakra Flour, Eggs, Salt, Sugar, Yeast, Mushrooms, Pepper, Meat, Mozzarella Cheese, Tomato Sauce, Sausage, Mayonnaise, Butter, Onions, Garlic, Chili Sauce, Milk, Chocolate, and Red Beans are the main raw materials in bun making at Bakery X. HOQ is a matrix included in the method of implementing the quality function, which aims to determine the important points of halalness in the business process of making buns. The initial QFD model in this study was made based on the guidelines for GMP (Good Manufacturing Practices) criteria and the halal critical point in the Bakery according to the MUI. After the initial QFD model was designed, the halal factors were validated by the LPPOM MUI and the company management through interviews and standard weighting Jaswir et al. (2020).

b. Actor

Actors are all parties involved in the business processes that exist in the company. Actors become one of the important factors that can affect the reliability of the production process (Maarif, 2016).

c. Documents

Documents are factors that can affect the sustainability of business processes in a company. Documents are very important because they are proof that the company has carried out production according to procedures. All activities that are fully and clearly documented can minimize the occurrence of illegal processes (Maarif, 2016).

d. Tools

The tools must meet the existing requirements because they can affect the continuity of business processes. There are several requirements from LPPOM MUI that must be met regarding the tools used during the production process, including: cleaning the production tool to avoid non-halal product residues, the containers used are clean and free from uncleanness, the use of halal brushes, and so on (Sagara, 2013).

e. Location or Environment

Location or environment is also one of the criteria that can affect the sustainability of business processes. The location of the company must be a clean industrial location, free from garbage, odor, smoke, and dirt. A separate location can prevent the product from being contaminated with non-halal ingredients (Kementrian Perindustrian, 2010).

2.3. Matrix 3 Business Process and Halal Critical

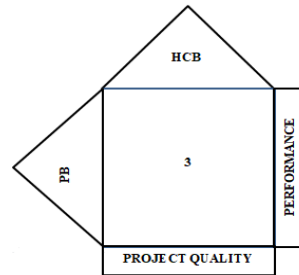


Figure 4. Matrix 3 Conceptual Model

In the halal assessment model using matrix 3 QFD, BP was made as attribute and HCB as technical response (Figure 4). GMP consists of criteria that had been adjusted with the actual condition of the bakery company.

3. Result and Discussion

The results of the halal assessment design at Bakery X obtained 17 Good Manufacturing Practices criteria selected from a total of 18 criteria as shown in Table 1. The selected Good Manufacturing Practices criteria are grouped using the SCOR model which is further divided into several components. The source consists of location components, buildings, sanitation facilities, machinery and equipment, materials, and employees. Make consists of monitoring processes, final products, packaging, labeling, storage of production equipment and raw materials, maintenance and sanitation programs, documentation and recording, product recalls, and program implementation. Delivery contains a transport component. In addition, weighting is also carried out on the selected criteria based on the level of importance of each criterion using a Likert scale (1-5 or very unimportant-very important).

The first data processing is carried out by calculating the standard aggregate in order to get the aggregate comparison value between the company and the auditor. Then the calculation of the planning matrix. The planning matrix itself is a matrix related to planning the fulfillment of the goals of the standard competency level set by the auditor and the company. In this matrix, a comparison is made between the aggregate values of competence for each production process and then the improvement ratio is calculated based on the goals of the aggregate value. The value of goals per standard requirement is obtained from the aggregate value of standard competence and the aggregate value of the company's competence, where the largest value of the two aggregate values will be the goals to be achieved. Based on these goals, an improvement ratio can be calculated as a comparison of the company's competency requirements. In addition to the improvement ratio, another component of the planning matrix is interest points. Interest points show the importance of each production process. The interest point value is directly proportional to the improvement ratio value where the value indicates the priority of improvements that the company needs to make. The calculation shows that the company still has to make improvements from the aspect of the study of matrix 1, matrix 2, and matrix 3. The next matrix components are raw weight and normalized raw weight. Raw weight is the weight obtained from the standard aggregate multiplication, improvement ratio, and interest point. The normalized raw weight which is the normalized value of the weight is then calculated by dividing the weight by the total weight of each standard requirement.

Emphasized that in addition to the planning matrix, a technical matrix was also made to show the percentage of the company's business process competency level gap with the standard competency level. Based on this matrix, it can be seen which business processes have the largest gaps so that business process improvement priorities are obtained. First of all, the value of the contribution of each business process is calculated (Helmi, 2019). According to This contribution, value shows the contribution of a process to the overall production process and is obtained from the normalized weight value with the relationship value on the HOQ and the weight of the GMP (Good Manufacturing Practices) criteria integrated with the business process. The other component is the normalization of the contribution value. This normalization is obtained by dividing the contribution value of a production process by the total contribution value of all business processes. Next, the standard and company competency level values are entered. Based on the standard and company level, the value of the two aspects is calculated by multiplying the value of the contribution above. The standard aspect is obtained from the multiplication of the standard competency level with the contribution value of the business process, while the corporate aspect is obtained from the multiplication of the company's competency level with the business process

contribution value. The percentage of the gap is then obtained by dividing the gap by the value of the largest aspect of the standard or company. The following are the results of data processing for matrix 1, matrix 2, and matrix 3.

3.1. Matrix 1 GMP (Good Manufacturing Practices) and Business Process

The results of the aggregate calculation on the company's standard requirements and Halal Auditor standards for Matrix 1 are in Table 3. Planning matrix is a matrix that deals with planning to meet the standard competency level goals set by auditors and companies. In this matrix, a comparison is made between the aggregate values of competence for each production process and then calculated the improvement ratio based on the goals of the aggregate value.

The value of goals per standard requirement is derived from the aggregate value of standard competence and the aggregate value of the competence of the company, where the largest value of both aggregate values will be the goals to be achieved. Based on these goals, it can be calculated improvement ratio as a comparison of the competence of the company's requirements.

In addition to the improvement ratio, another component of the planning matrix is the interest point. Interest points indicate the importance of each production process. The interesting point value can be worth 1.5 if the aggregate value of the standard competence is greater than the aggregate value of the company's competence and is worth 1.2 if the aggregate value of the company's competence is greater than the aggregate value of the standard competence. The interest point value is directly proportional to the value of the improvement ratio where the value indicates the priority of improvements that the company needs to make.

The next matrix components are raw weight and normalized raw weight. Raw weight is a weight obtained from the results of standard aggregate multiplication, improvement ratio, and interest point. The normalized raw weight which is the normalization value of weight is then calculated by dividing the weight against the total weight of each standard requirement. The results of the next planning matrix calculation can be seen in Table 3, Table 6, and Table 9.

Table 3. Matrix 1 Planning (*Performance*)

	GMP Criteria	Auditor Agregat	Company Agregat	Goal	Improvement Ratio	Interest Point	Weight	Normalized
Source	Location	3.48	3.42	3.48	1.02	1.5	1.53	0.066464
	Building	3.90	3.95	3.95	1	1.2	1.2	0.052129
	Sanitation Facilities	3.48	3.42	3.48	1.02	1.5	1.53	0.066464
	Machinery and Tools	3.90	3.84	3.90	1.02	1.5	1.53	0.066464
	Material	3.48	3.41	3.48	1.02	1.5	1.53	0.066464
	Employees	3.90	3.84	3.90	1.02	1.5	1.53	0.066464
	Training	2.82	2.89	2.89	1	1.2	1.2	0.052129
Make	Process Monitoring	3.66	3.84	3.84	1	1.2	1.2	0.052129
	The final product	0.90	0.98	0.98	1	1.2	1.2	0.052129
	Packaging	1.32	1.51	1.51	1	1.2	1.2	0.052129
	Label	1.92	2.14	2.14	1	1.2	1.2	0.052129
	Storage of Production	3.00	3.10	3.10	1	1.2	1.2	0.052129
	Tools and Raw Materials							
	Maintenance And Sanitation Program	4.08	4.05	4.08	1.01	1.5	1.52	0.06603
	Documentation and Recording	1.50	1.61	1.61	1	1.2	1.2	0.052129
	Product Withdrawal	1.32	1.30	1.32	1.02	1.5	1.53	0.066464
	Guideline	2.82	2.78	2.82	1.01	1.5	1.52	0.06603
	Implementation							
Delivery	Transport	2.82	2.99	2.99	1	1.2	1.2	0.052129

In addition to the planning matrix, a technical matrix is also created to see the percentage of the gap in the competence level of the company's business processes with a standard level of competence. Based on this matrix, it can be seen that business processes have the largest gap so that business process improvement priorities are obtained.

First of all, calculate the contribution value of each business process. This contribution value shows the contribution of a process to the production process as a whole and is derived from the normalized weight value with the relationship value in HOQ and the weight of the GMP (Good Manufacturing Practices) criteria integrated with the business process.

The other component is the normalization of the contribution value. This normalization is obtained by dividing the contribution value of a production process by the total contribution value of the entire business process. Furthermore, enter the value of standard and company competency levels. Based on the standard and company level, calculated the value of both aspects multiplied by the value of the above contribution. The standard aspect is obtained from the multiplication of the standard competency level with the value of business process contribution, while the company aspect is obtained from the multiplication of the company's competency level with the value of business process contribution. The percentage gap is then obtained by dividing the gap against the value of the largest aspect of the standard or company. Furthermore, the technical matrix calculation can be seen in Table 4, Table 7, Table 10.

Table 4. Matrix 1 Technical (Project Quality)

	Raw Material Purchase	Raw Material Selection and Sorting	Raw Material Cleaning	Storage	Processing of Semi-Finished Materials	Delivery of Semi-Finished Materials to Outlet	Finished Material Processing	Finishing And Plating	Sales
Contribution Value	1.263970	0.474828	1.306526	0.681955	0.756394	0.361572	0.140888	0.908199	0.471943
Contribution Normalization	0.198542	0.074585	0.205226	0.107120	0.118813	0.056795	0.022130	0.142658	0.074132
Standard	5.055881	1.899311	5.226105	2.727820	3.781972	1.446288	0.704442	4.540994	1.415829
GMP Criteria Level									
Company Gmp Criteria Level	6.319851	1.424484	6.532631	3.409775	3.025578	1.446288	0.563554	4.540994	1.887771
Gap	1.263970	-	1.306526	0.681955	-	0.000000	-	0.000000	0.471943
% Gap	0.25	0.474828	0.25	0.25	0.756394	0	0.140888	0	0.33

Table 5. Matrix 1 Standard Compliance

	GMP Criteria	Improvement Ratio	Weight	Normalized
Source	Location	1.02	1.53	0.066464
	Sanitation Facilities	1.02	1.53	0.066464
	Machinery and Tools	1.02	1.53	0.066464
	Material	1.02	1.53	0.066464
	Employees	1.02	1.53	0.066464
Make	Maintenance and Sanitation Program	1.01	1.52	0.06603
	Product Withdrawal	1.02	1.53	0.066464
	Guideline Implementation	1.01	1.52	0.066030

There are 8 requirements of the GMP Criteria that are integrated with the SCOR model whose standards were not met by the company.

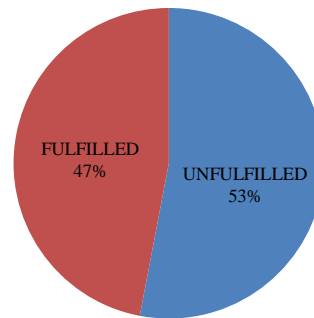


Figure 5. Compliance with the Requirements of the Matrix 1 Standard

The total weight of the requirements that can meet the standards compared to those that do not meet the standards is shown, seen in Figure 5, where 53% of the requirements not met. This 53% value means that there are some standards that have been set by halal auditors who are unable to meet the company requirements that cannot be met by the company seen in Table 5. and this normalized value is summed up then resulting in a value of 53%. This is known from the value of the improvement ratio which has a value greater than one. The designed assessment tool is able to see the ability of the bakery company in meeting the standards of matrix 1.

3.4. Matrix 2 GMP (Good Manufacturing Practices) and Halal Critical Bakery

The calculation result of the company and auditor standard on matrix 2 can be seen in Table 6.

Table 6. Matrix 2 Planning (*Performance*)

	Kriteria GMP	Auditor Agregat	Company Agregat	Goal	Improvement Ratio	Interest Point	Weight	Normalized
Source	Location	0.80	0.80	0.80	1	1.2	1.2	0.047207
	Building	1.60	1.40	1.60	1.14	1.5	1.71	0.06727
	Sanitation Facilities	2.40	2.20	2.40	1.09	1.5	1.64	0.064516
	Machinery And Tools	3.65	3.45	3.65	1.06	1.5	1.59	0.062549
	Material	4.10	4.20	4.20	1	1.2	1.2	0.047207
	Employees	3.30	3.40	3.40	1	1.2	1.2	0.047207
	Training	0.80	0.60	0.80	1.33	1.5	2	0.078678
Make	Process Monitoring	4.10	4.20	4.20	1	1.2	1.2	0.047207
	The final product	2.40	2.20	2.40	1.09	1.5	1.64	0.064516
	Packaging	2.40	2.20	2.40	1.09	1.5	1.64	0.064516
	Label	3.30	3.40	3.40	1	1.2	1.2	0.047207
	Storage of Production Tools And Raw Materials	4.10	4.20	4.20	1	1.2	1.2	0.047207
	Maintenance And Sanitation Program	3.65	3.45	3.65	1.06	1.5	1.59	0.062549
	Documentation And Recording	2.50	2.60	2.60	1	1.2	1.2	0.047207
	Product Withdrawal	2.85	2.65	2.85	1.08	1.5	1.62	0.063729
	Implementation of the Guidelines	0.80	0.60	0.80	1.33	1.5	2	0.078678
Delivery	Transport	3.65	3.45	3.65	1.06	1.5	1.59	0.062549

Table 7. Matrix 2 Technical (Project Quality)

	Bun raw material	Actor	Document	Tools	Location/Environment
Contribution Value	0.816585	1.427465	0.237923	0.874283	0.880786
Contribution Normalization	0.192725	0.336901	0.056153	0.206343	0.207878
Standard GMP criteria level	4.082926	5.709859	0.713770	3.497132	3.523145
Corporate GMP criteria level	4.082926	4.282394	1.189616	3.497132	3.523145
Gap	0.000000	-1.427465	0.475847	0.000000	0.000000
% Gap	0	-0.25	0.66	0	0

Table 8. Matrix 2 Standard Compliance Requirements

	GMP Criteria	Improvement Ratio	Weight	Normalized
Source	Building	1.14	1.71	0.06727
	Sanitation Facilities	1.09	1.64	0.064516
	Machinery And Tools	1.06	1.59	0.062549
	Training	1.33	2	0.078678
Make	The final product	1.09	1.64	0.064516
	Packaging	1.09	1.64	0.064516
	Maintenance And Sanitation Program	1.06	1.59	0.062549
	Product Withdrawal	1.08	1.62	0.063729
	Implementation of the Guidelines	1.33	2	0.078678
Delivery	Transport	1.06	1.59	0.062549

There are 10 requirements of the GMP Criteria that are integrated with the SCOR model whose standards have not been met by the company.

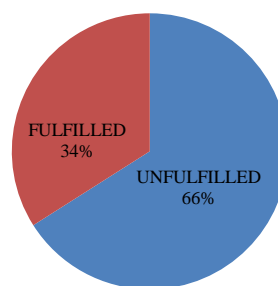


Figure 6. Compliance with the Requirements of the Matrix 2 Standard

The total weight of the requirements that can meet the standard compared to those who do not meet the standard where 66% of the requirements have not been met. This 66% value means that there are some standards that have been set by halal auditors who are unable to meet the company requirements that cannot be met by the company seen in Table 8. and this normalized value is summed up then resulting in a value of 66%. This can be seen from the value of the improvement ratio which has a value greater than one. The measuring instrument designed is able to see the ability of bakery companies to meet the standards of matrix 2 (Figure 6).

3.5. Matrix 3 Business Process and Halal Critical

In the halal assessment model using QFD matrix 3, Business Process is placed as an attribute while Halal Critical Bakery is a technical response. The Business Process contains criteria that have been adjusted to the actual conditions in the bakery company. The calculation on the standard requirements of matrix 3 can be seen in Table 9.

Table 9. Matrix 3 Planning (*Performance*)

Business Process	Auditor Agregat	Company Agregat	Goal	Improvement Ratio	Interest Point	Weight	Normalized
Purchase of raw materials	4.10	4.20	4.20	1	1.2	1.2	0.093567
Selection and sorting of raw materials	2.85	2.95	2.95	1	1.2	1.2	0.093567
Raw material cleaning	3.65	3.45	3.65	1.06	1.5	1.59	0.123977
Storage	4.10	4.20	4.20	1	1.2	1.2	0.093567
Processing of semi-finished materials	4.10	4.20	4.20	1	1.2	1.2	0.093567
Delivery of semi-finished materials	4.10	4.20	4.20	1	1.2	1.2	0.093567
To the outlet	2.85	2.95	2.95	1	1.2	1.2	0.093567
Processing	4.10	4.20	4.20	1	1.2	1.2	0.093567
Finished material	2.85	2.95	2.95	1	1.2	1.2	0.093567
Finishing and plating	2.40	2.20	2.40	1.09	1.5	1.635	0.127485

Table 10. Technical Matrix 3 (Project Quality)

	Bun raw material	Actor (Employee)	Document	Tools	Location/Environment
Contribution Value	1.121051	1.570523	0.547367	1.345963	1.345963
Contribution Normalization	0.189020	0.264805	0.092291	0.226942	0.226942
Standard GMP criteria level	5.605256	6.282094	1.642101	5.383850	5.383850
Corporate GMP criteria level	5.605256	4.711570	2.736835	5.383850	5.383850
Gap	0.000000	-1.570523	1.094734	0.000000	0.000000
% Gap	0	-0.25	0.66	0	0

Table 11. Fulfillment of Technical Responses Matrix 3

Halal Critical	Contribution Normalization	Gap
Actor (Employee)	0.264805	0.25

The critical halal component that cannot be fulfilled by the company is 26%, while the other 74% can be fulfilled by the company. This 26% value means that there are some standards that have been set by halal auditors who are unable to meet the company requirements that cannot be met by the company seen in Table 10. and this normalized value is summed up then resulting in a value of 26%. This can be seen from the value of the improvement ratio which has a value greater than one. The measuring instrument designed is able to see the ability of bakery companies to meet the standards of matrix 3.

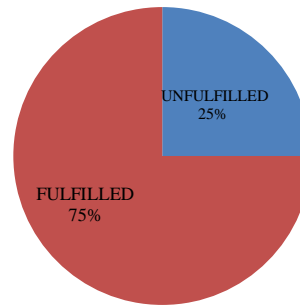


Figure 7. Compliance with the Requirements of the Matrix 3 Standard

Technical response matrix 3 that has not been able to be fulfilled by the company can be seen in the Table of Fulfillment of Technical Responses matrix 3. This 25% value means that there are some standards that have been set by halal auditors who are unable to meet the company requirements that cannot be met by the company seen in Table 11 and this normalized value is summed up then resulting in a value of 25%. The results of this calculation indicate that the measuring instrument designed is able to see the ability of the bakery industry in fulfilling the technical response in matrix 3 (Figure 7).

3.6 Proposed Improvements to the Gap at Bakery X

There are 4 proposals for improvement given to the company: proposal A (Providing personal hygiene training for food processing), proposal B (Adding an inspector for supervision of hygiene practices), proposal C (Providing rewards and punishments), and proposal D (Adding the hygiene inspection process to employees).

Proposal A refers to the company having to provide training within a certain period of time for example, every 6 months to employees on the basics of hygiene, factors that cause quality and safety decline, factors that cause disease and poisoning, CPPOB, training on basic principles cleaning and sanitation as well as material handling and cleaning training. This training aims to provide awareness to employees of the importance of maintaining hygiene for themselves, others, and in the company environment where they work.

Proposal B suggests adding a hygiene practice inspector who is in charge of supervising employees in practicing hygiene within the company, such as checking the completeness of basic personal protective equipment, checking nails, checking body temperature, and other inspections related to employee hygiene in order to maintain halalness, cleanliness and product safety of the company.

Proposed C refers to rewards and punishments, such as giving gifts every month to employees who have the highest points in hygiene practices and giving punishments in the form of salary deductions or suspensions for employees who violate the hygiene practices established by the company. Proposal C aims to motivate employees to compete in maintaining their hygiene practices in the company properly while still paying attention to the halal side.

Proposed D is to increase the hygiene inspection process before starting any activity in the company. The inspection process in question includes checking employee body temperatures, checking nails, and so on related to hygiene at the company. This inspection process is carried out so that hygiene practices in the company can be maintained properly in order to maintain the halalness, cleanliness and safety of the products produced by the company. An improvement matrix for proposed improvements to bakery X can be seen in Table 12.

Table 12. Improvement Proposal to Bakery X

Business Process	Improvement Proposal								Performance		
	Proposal A		Proposal B		Proposal C		Proposal D		Importance Level	Weight	Weight (%)
Raw Material Selection and Sorting	1.71	9	0.57	3	0.57	3	1.71	9	4	1	19.047%
Raw Material Cleaning	1.71	9	1.71	9	0.57	3	1.71	9	4	1	19.047%
Semi-Finished Material Processing	2.16	9	0.72	3	0.72	3	2.16	9	5	1.25	23.810%
Finished Material Processing	2.16	9	0.72	3	0.72	3	2.16	9	5	1.25	23.810%
Sales	0.42	3	0.42	3	0.42	3	1.26	9	3	0.75	14.286%
<i>Absolute Importance</i>	8.16		4.14		3.00		9.00		24.30	5.25	100%
<i>Percent Importance</i>	33.580%		17.037%		12.346%		37.037%		100%		
<i>Ranking</i>	2		3		4		1				

Description:

Proposal Code	Improvement Proposal
Proposal A	: Providing personal hygiene training for food processing
Proposal B	: Adding an inspector for hygiene practice supervision
Proposal C	: Giving rewards and punishments
Proposal D	: Adding a hygiene inspection process to employees

Recommendations for improvement that have a weight percentage of 37.037% and rank 1 were chosen, which is Proposal D, which refers to increasing the hygiene inspection process for employees. Thus, it can be concluded that the company must add a hygiene inspection process to employees before carrying out activities related to business processes in the company in order to avoid bacterial contamination and other harmful substances to the products produced by the company. The following graph of the analysis of the proposal given to Bakery X is shown in Figure 8.

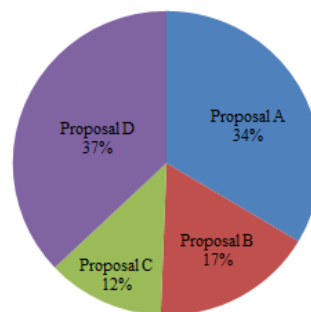


Figure 8. Percentage of Proposed Improvements to Bakery X

Figure 8. shows that the proposal needed to be immediately carried out by Bakery X is proposal D which has the highest percentage of 37.04%. The intended proposal D is to add a hygiene inspection process before starting the activities at the company. The inspection process in question, such as checking employee body temperature, checking nails, and so on, is related to hygiene at the company. This inspection process is carried out so that hygiene practices in the company can be maintained properly in order to maintain the halalness, cleanliness, and safety of the products produced by the company.

4. Conclusion

The conceptual model of halal readiness using the Quality Function Deployment method designed in this study consists of 3 matrixes. Matrix 1 is the relationship between Good Manufacturing Practices or attributes with the Production Process (PP) or as a technical response. Matrix 2 consists of Good Manufacturing Practices (GMP) or attributes with Halal Critical Bakery (HCB) or technical responses. Matrix 3 consists of the Production Process (PP) or attributes with Halal Critical Bakery (HCB) as a technical response. On matrix 1, there are 3 gaps in the raw material selection and sorting, semi-finished

material processing, and finished material processing. On matrix 2, the gap is only found on halal critical bakery on the actor factor (employee). On matrix 3, it also only happens on halal critical bakery on the actor factor (employee). Based on the 3 matrices, it is concluded that actor or employee is the halal critical point because only on the standard components of actors that bakery X cannot meet and the improvement proposal is to add more hygiene inspection processes on employees before conducting any activities in the company.

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